

Figure 1. Multiple line monitor

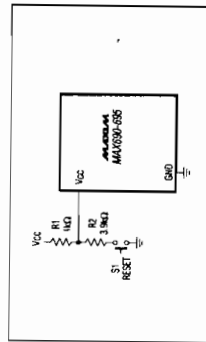


Figure 2. Manual reset with debounced input.

Additional Features

Monitoring Multiple Power Supplies

Both the power- $\bar{A}$ circuit and the low-line input (L $\bar{A}$) of MAX6965 and MAX6967 devices can monitor multiple power supplies (Figure 1). Low leakage into these CMOS inputs allows use of high-resistance voltage dividers that draw little current from their sources—an advantage when monitoring a backup battery.

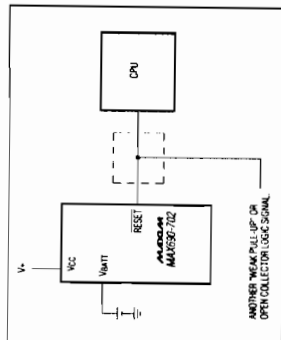


Figure 3. Because the MAX6960 family employs "weak pull-up" outputs, they can be connected to form a "wired NOR" gate, thus saving an extra component.

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General Description

The MAX1232 microprocessor (μ P) supervisory circuit provides μ P "housekeeping" and power-supply supervision functions while consuming only 1/10th the power of the DS1232. The MAX1232 enhances circuit reliability in μ P systems by monitoring the power supply, monitoring software execution, and providing a debounced manual reset input. The MAX1232 is a plug-in upgrade of the Dallas DS1232.

A reset pulse of at least 250ms duration is supplied on power-up, power-down, and low-voltage brown-out conditions (5% or 10% supply tolerances can be selected digitally). Also featured is a debounced manual reset input that forces the reset outputs to their active states for a minimum of 250ms. A digitally-programmable watchdog timer monitors software execution and can be programmed for timeout settings of 150ms, 600ms, or 1.2sec. The MAX1232 requires no external components.

Applications

Computers
Controllers
Intelligent Instruments
Automotive Systems
Critical μ P Power Monitoring

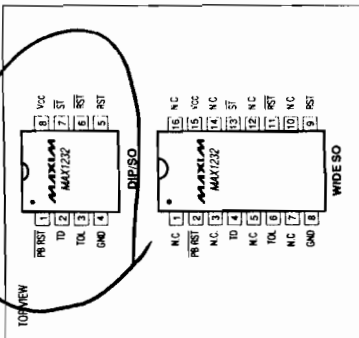
- ### Features
- Consumes 1/10th the Power of the DS1232
 - Precision Voltage Monitor - Adjustable $\pm 4.5V$ or $\pm 4.75V$
 - Power OK/Reset Pulse Width - 250ms Min
 - No External Components
 - Adjustable Watchdog Timer - 150ms, 600ms, or 1.2sec
 - Debounce Manual Reset Input for External Override
 - Available in 8-pin DIP/Small Outline and 16-pin Wide Small Outline Packages

Ordering Information

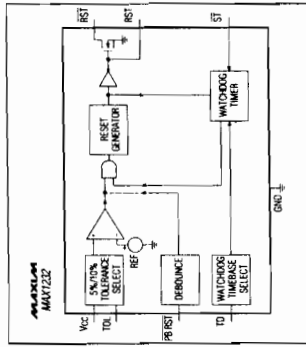
PART	TEMP RANGE	PIN-PACKAGE
MAX1232CPA	0°C to +70°C	8-Pin DIP
MAX1232CSA	0°C to +70°C	8-Pin SO
MAX1232CWE	0°C to +70°C	16-Wide SO
MAX1232CJD	0°C to +70°C	Dip-8
MAX1232EPA	-40°C to +85°C	8-Pin DIP
MAX1232ESA	-40°C to +85°C	8-Pin SO
MAX1232EWA	-40°C to +85°C	16-Wide SO
MAX1232MJA	-55°C to +125°C	8-Pin DIP

* Contact factory for dice specifications.

Pin Configuration



Block Diagram



MAX1232 Microprocessor Monitor

MAX1232 Microprocessor Monitor

ABSOLUTE MAXIMUM RATINGS

Voltage on any pin (with respect to GND)	-1V to +7V	Storage Temperature Range	-65°C to +160°C
Operating Temperature Range:		Lead Temperature (Soldering, 10 sec.)	+300°C
MAX1232C	0°C to +70°C		
MAX1232E	-40°C to +85°C		
MAX1232M	-55°C to +125°C		

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED D.C. OPERATING CONDITIONS

(TA = TMIN to TMAX)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	VCC		4.5	5.0	5.5	V
ST and PB RST	VIH		2.0		VCC + 0.3	V
ST and PB RST	UIL		-0.3		+0.8	V

D.C. ELECTRICAL CHARACTERISTICS

(TA = TMIN to TMAX; VCC = +4.5V to +5.5V)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input leakage ST, TOL	ILI		-1.0		+1.0	μA
Output Current RST	IOH	VOH = 2.4V	-1.0	-12		mA
Output Current RST, RST	IOL	VOL = 0.4V	2.0	10		mA
Operating Current (Note 2)	ICC			50	200	μA
VCC 5% Trip Point (Note 3)	VCCTP	TOL = GND	4.50	4.62	4.74	V
VCC 10% Trip Point (Note 3)	VCCTP	TOL = VCC	4.25	4.37	4.49	V

CAPACITANCE (Note 4)

(TA = +25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Capacitance ST, TOL	CIN				5	pF
Output Capacitance RST, RST	COUT				7	pF

A.C. ELECTRICAL CHARACTERISTICS

(TA = TMIN to TMAX; VCC = +5V to ±10%)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
PB RST (Note 5)	trp	Figure 3	20			ns
PB RST Delay	trpD	Figure 3	1	4	20	ns
Reset Active Time	tRST		250	610	1000	ns
ST Pulse Width	tST	Figure 4	75			ns
ST Timeout Period	tTO	Figure 4 TO pin = 0V TO pin = open	62.5	150	250	ms
		TO pin = VCC	500	1200	2000	ms
VCC Fall Time (Note 4)	tF	Figure 5	10			μs
VCC Rise Time (Note 4)	tR	Figure 6	0			μs
VCC Detect to RST High and RST Low	tRCD	Figure 7, VCC falling			100	ns
VCC Detect to RST Low and RST Open (Note 6)	tRCD	Figure 8, VCC rising	250	610	1000	ns

Note 1: PB RST is internally pulled up to VCC with an internal impedance of typically 40kΩ.

Note 2: Measured at VCC = 5.0V.

Note 3: All outputs referenced to GND.

Note 4: Guaranteed by design.

Note 5: PB RST must be held low for a minimum of 20ms to guarantee a reset.

Note 6: tr = 5μs.

MAX1232 Microprocessor Monitor

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MAX1232 Pin Description

NAME	FUNCTION
PB RST	Pushbutton Reset Input. A debounced active-low input that ignores pulses less than 1ms in duration and is guaranteed to recognize inputs of 20ms or greater.
TD	Time Delay Set. The watchdog timerbase select input (TID = 150ms for TD = 0V, TID = 600ms for TD = open, TID = 1.2sec for TD = VCC).
TOL	Tolerance input. Connect to GND for 5% tolerance or to VCC for 10% tolerance.
GND	Ground
RST	Reset Output (Active-High) - goes active: 1. If VCC falls below the selected reset voltage threshold. 2. If ST is forced low. 3. If ST is not strobed within the minimum timeout period. 4. During power-up.
RST	Reset Output (Active Low, Open Drain) - see RST.
ST	Strobe input. Input for watchdog timer.
VCC	The +5V Power-Supply Input.
N.C.	No Connect

Detailed Description

Power Monitor

A voltage detector monitors VCC and holds the reset outputs (RST and RST) in their active states whenever VCC is below the selected 5% or 10% tolerance (4.62V or 4.37V typically). To select the 5% level, connect TOL to ground. To select the 10% level, connect TOL to VCC. The reset outputs will remain in their active states until VCC has been continuously in-tolerance for a minimum of 250ms (the reset active time) to allow the power supply and μP to stabilize.

The RST output both sinks and sources current, while the RST output, an open-drain MOSFET, sinks current only and must be pulled high.

Pushbutton Reset Input

The MAX1232's debounced manual reset input (PB RST) manually forces the reset outputs into their active states. The reset outputs go active after PB RST has been held low for a time t_{PBD} , the pushbutton reset delay time. The reset outputs remain in their active states for a minimum of 250ms after PB RST rises above V_{IH} (Figure 3).

A mechanical pushbutton or an active logic signal can drive the PB RST input. The debounced input ignores input pulses less than 1ms and is guaranteed to recognize pulses of 20ms or greater. The PB RST input has an internal pull-up to VCC of about 100 μA ; therefore, an external pull-up resistor is not necessary.

Watchdog Timer

The μP drives the ST input with an Input/Output (I/O) line. The μP must toggle the ST input within a set period (as determined by TD) to verify proper program execution. If a hardware or software timeout occurs, ST from toggling by falling edges (a high-to-low transition) - the MAX1232 reset outputs are forced to their active states for 250ms (Figure 2). This typically initiates the μP 's power-up routine. If the interruption continues, new reset pulses are generated each timeout period until ST is strobed. The timeout period is determined by the TD input connection. This timeout period is typically 150ms with TD connected to GND, 600ms with TD floating, or 1200ms with TD connected to VCC.

The software routine that strobes ST is critical. The code must be in a section of software that executes frequently enough so the time between toggles is less than the watchdog timeout period. One common technique controls the μP I/O line from two sections of the program. The software might set the I/O line high while operating in the foreground mode and set it low while in the background or interrupt mode. If both modes do not execute correctly, the watchdog timer issues reset pulses.

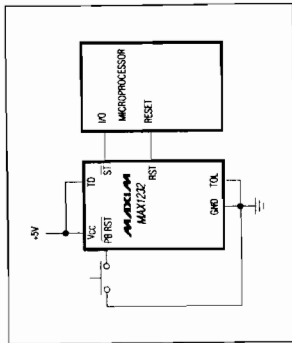


Figure 1. Pushbutton Reset

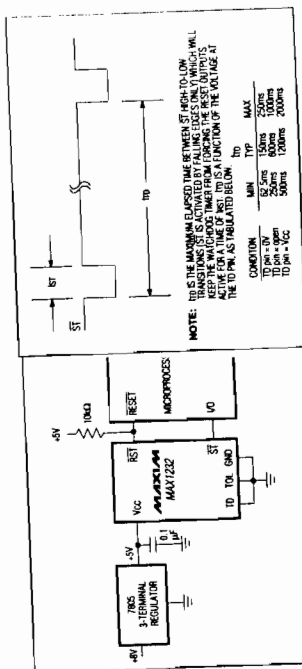


Figure 2. Watchdog Timer

Figure 4. Watchdog Strobe Input

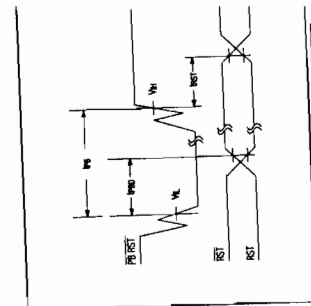


Figure 3. Pushbutton Reset. The debounced PB RST input ignores input pulses less than 1ms and is guaranteed to recognize pulses of 20ms or greater.

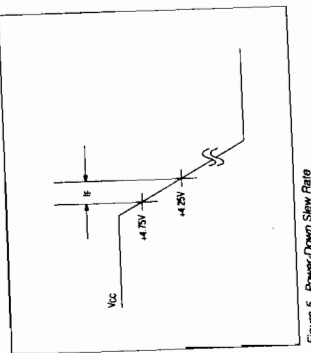


Figure 5. Power-Down Slew Rate

MAXIM

MAX1259 Battery Manager

MAX1232 Microprocessor Monitor

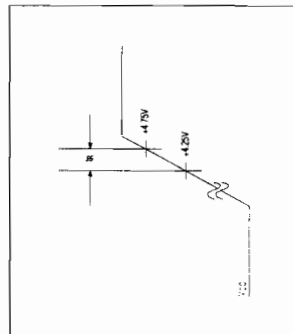


Figure 6 Power-Up Slew Rate

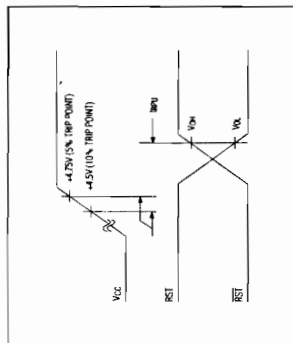


Figure 8 VCC Detect Reset Output Delay (Power-Up)

Chip Topography

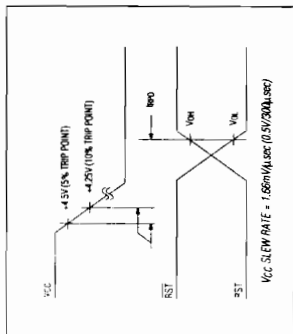
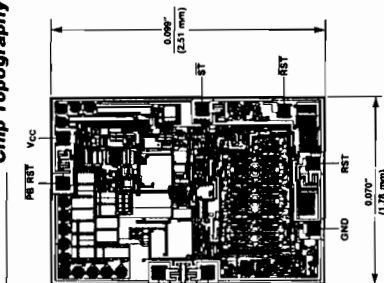


Figure 7 VCC Detect Reset Output Delay (Power-Down)



General Description

The MAX1259 battery manager provides backup-battery switching for CMOS RAM, microprocessors, or other low-power logic ICs. It automatically switches to the backup battery when the primary power input is interrupted. Low-loss switches guarantee input-to-output differential of only 200mV while supplying 250mA from the primary power supply or 15mA from the battery.

Battery discharge during shipping does not occur in the MAX1259, since the backup battery can be disconnected by strobing the RST input.

Applications

Battery Backup for CMOS RAM
Uninterruptible Power Supplies
Computers
Controllers
Automotive Systems

Features

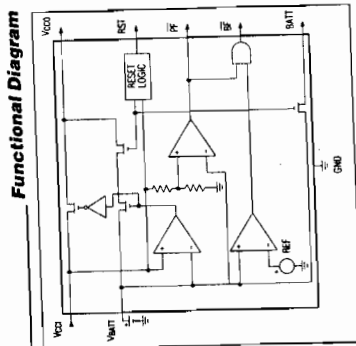
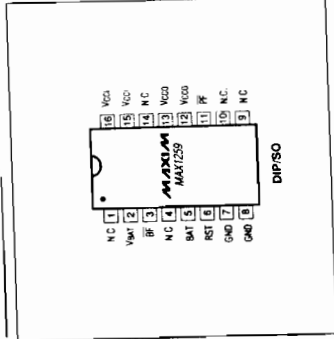
- Switches to Backup Battery if Power Fails
- Consumes Less than 100nA of Battery Current
- Power-Fail Output Signals Primary Power-Supply Loss
- Battery Monitor Indicates Low Battery
- Battery Can Be Disconnected to Prevent Discharge During Shipping
- Battery Automatically Reconnected when Vcc is Applied
- Pin-Compatible with the DS1259
- Supply Current Three Times Lower than DS1259
- Available in Industrial and Military Temperature Ranges

Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE
MAX1259CPE	0°C to +70°C	16 Plastic DIP
MAX1259CWE	0°C to +70°C	16 Wide SO
MAX1259COW	0°C to +70°C	Dual*
MAX1259EPE	-40°C to +85°C	16 Plastic DIP
MAX1259EWE	-40°C to +85°C	16 Wide SO
MAX1259MUE	-55°C to +125°C	16 CERDIP

*Contact factory for dice specifications.

Pin Configuration



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